Foreign Direct Investment Inflows in Haiti: Its Determinants and Impact on Economic Growth
Chen-Chang Lo, Yaling Lin⁴, Tsung-Li Chi and Dominique Jude Joseph

Abstract
This research is intended to look for the main determining factors of FDI inward in Haiti and to assess its impacts on economic growth during the period 1980-2010. Because of the interdependence between FDI and growth, a system of two simultaneous equations has been estimated by the two-stage least squares (2SLS). The regressions display that FDI and economic growth interact positively but this interaction is weak. In fact, economic growth has no significant impact on FDI and this latter does not influence economic growth. Furthermore, market size (GDP per capita), level of human capital and exchange rate prove to be the explanatory factors of determination of FDI flows into Haiti and they have a significant positive influence on net FDI inflows.

Key words: foreign direct investment, economic growth, simultaneous equations model

INTRODUCTION
During the last three decades, the size and destination of foreign direct investment have been significantly changed (Huffel, 2001; Vergnaud, 2005). In a context of globalization, openness and liberalization of markets, where entry barriers and frontiers between states or countries are almost inexistent, the world total FDI has progressively increased and its growth was exponential and phenomenal. As to the destination, if traditionally, “FDI was a phenomenon that primarily concerned highly developed economies” (Nunnenkamp, 2001), it is observed that FDI tends nowadays to concentrate more in the developing countries. In the last years, though the share of worldwide FDI remains higher in developed countries than in developing countries, the tendency for FDI inflows is the contrary. In fact, FDI inflows into developed countries turned out to be lower than the ones to developing countries. According to Nunnenkamp, “average annual FDI flows to developing countries soared eightfold when comparing 1982-1987 and 1994-1999. As a result, developing countries have attracted almost one third of worldwide FDI flows recently” (Nunnenkamp, 2001, p. 4). According to the World Bank (2002), FDI into developing countries increased nearly tenfold from 1990 to 2003. Furthermore, this trend of FDI to shift of location was accentuated in 2010. Developing and transition economies, for the first time, received more than 50% of global FDI flows (UNCTAD, 2011). The few aforementioned statistics can attest to the spectacular growth of FDI and its important role in world economy (an important role in expansion of international markets and productions). Even countries which, during the years 1950-1960, viewed it with mistrust and suspicion and saw it as a real threat in the sense that the inflows of foreign assets could harm, damage and adversely affect their national sovereignty (Alaya, 2004), have radically changed their behavior towards FDI and have adopted a package of incentives, such as offering tax incentives, infrastructure subsidies, import duty exemptions (Aitken & Harrison, 1999), in order to convince multinational firms, transnationals corporations to enter into their markets and make substantial investments. As “FDI usually flows as a bundle of resources including, besides capital, production technology, organizational and managerial skills, marketing know-how, and even market access through the marketing networks of multinational enterprises (MNEs) who undertake FDI” (Kumar, 2003, p. 6), and hence, it may constitute a stimulus for the economic growth and contribute to local development efforts, its attraction has become priority for almost all the country policymakers.

There’s no doubt that developing countries are engaging in an intense battle and a fierce competition for attracting FDI, which, unlike the other forms of investments, is more stable, long-term committed and can bridge the gap between domestic savings and investment (Hayami, 2001; Todaro & Smith, 2003).

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However, despite the plausible theoretical potential advantages of FDI, which range from technology transfer, new management skills, productivity gains, market know-how to job creation, the question relative to the relation between FDI and growth is still fervently questionable and debatable. Empirical evidence on this nexus is mixed. According to Townsend (2003), the link between foreign direct investment and economic growth is unclear and ambiguous. Do inward FDI flows necessarily and automatically lead or imply higher growth rate?

Fluctuating over time period, FDI influences positively economic growth only in some particular environments and conditions, mostly related to the host country characteristics, such as the level of human capital (Borensztein, Gregorio, & Lee, 1998; Mello, 1999). From a cross section and panel data analysis, Johnson (2006) establishes that FDI contributes to economic growth in developing countries, which suffer from low productivity and capital stock deficiencies. Alfaro (2003), by conducting a cross-country analysis, finds that FDI inflows into the primary sector tend to exert a negative impact on growth. From a sample of 72 countries (developed and developing), Carkovic and Levine (2002) notice that FDI inflows don’t exert any influence on economic growth. Subsequently, if the explosion of FDI flows in world economy is indubitable; the effects on growth are still inconclusive and elusive.

Since the end of the Duvalier regime in February 1986, Haiti seldom experienced periods of stability. For over twenty years, Haiti, like most of the less developed countries, launched into an unprecedented opening of its economy through deregulation, privatization and private sector participation in the supply of infrastructure. In this same standpoint of attracting and promoting the development of private investment, the Haitian Government implemented in 2002 several policy instruments such as the Investment Code and the Free Zones Act. According to statistics from the Bank of the Republic of Haiti (BRH), FDI inflows rose to $US 30 million in 1999, largely due to the telecommunications sector liberalization with the entry of two mobile phone service providers. During the five-year term 2005-2010, inward FDI flows have reported quite interesting propensities, with volumes very much higher than those observed for almost all previous years and for the first time, over 100 million (BRH, Annual Report). With a historical maximum value of $US 160 million in 2006, net inflows of FDI amounted to $US 150 million in 2010. In addition, in percentage of GDP, they represented 3.29 and 2.24 respectively in 2006 and 2010.

How can this more or less considerable record of FDI be explained? What factors shape the ability to attract FDI in Haiti? What are the macroeconomic aggregates that determine the inflows of FDI in the recipient country? What are the real effects of FDI on economic growth in Haiti? Do these investments have any tangible impact on economic growth? Given the importance of FDI in the economies of developing countries, this thesis is intended to answer the preceding questions and elaborated in a twofold purpose:

1. To estimate the main determining factors of inward FDI in Haiti.
2. To evaluate the impact of FDI on the Haitian Economy.

Our study differs in several points from previous empirical researches. Firstly, the period under investigation is particular and important as it takes into account the recent evolutions of FDI inflows. Secondly, in addition to include new relevant macroeconomic variables on the one hand, and on the other hand, based on a system of two equations, our model is constructed and estimated by the two-stage least squares (2SLS) whereas scholars, such as Calice (2008), have more privileged the VAR methodology.

The remainder of this paper is arranged as follows. Section 2 focuses on the literature review and theoretical framework. Section 3 outlines the methodological approach. Section 4 provides the estimation and the analysis of our model equations, which will statistically be tested in order to ensure their validity. Section 5 concludes this paper.

LITERATURE REVIEW

FDI can be defined as the acquisition of a substantial controlling interest in an overseas firm by an investor or the setting up of a subsidiary in a foreign country. The direct investor exerts a significant influence in the enterprise management. Furthermore, the establishment of a long-term relationship that involves ownership and control of a business abroad, by the possession of at least 10% of the ordinary or voting power in the host enterprise, makes FDI different from portfolio investment. Its distinctive feature
is that “it involves not only a transfer of resources but also the acquisition of control” (Krugman & Obstfeld, 2009).

FDI determinants, particularly in the developing countries, are increasingly becoming the subject of many studies. Because of the non-existence of theories that could encompass all forms of FDI, scholars or policymakers who have sought to explain and analyze the inward FDI in some countries, have integrated in the equation of FDI determinants a whole set of variables, which sometimes are intuitive or relevant/relevant to the characteristics of countries under-study. Nevertheless, from the diverse econometric modeling of FDI inflows, two main groups of factors can be retained: (i) economic factors which include market size, fiscal and monetary policies, natural resources, etc. (Morisset, 2000), (Asiedu, 2002) and (ii) the institutional variables including good governance, political stability, investment climate, corruption (Jean Baptiste, 2010).

Asiedu (2002), for example, analyzed the factors affecting FDI in Sub-Saharan Africa. To conduct her study, she considered a sample of seventy-one countries including thirty-two are from sub-Saharan Africa and the rest are non-sub-Saharan African countries. With a dataset of over period of 10 years, her model, estimated by ordinary least square (OLS) as method, takes into account variables that are relevant to the economic and business climate such openness to trade, infrastructures quality, labor cost. She observed that the factors that motive FDI inflows to Africa are not the same as those in other developing countries. In fact, a few variables have been found not significant for sub-Saharan African countries while their significance has been proved for developing countries. Moreover, in addition to support that African countries are market seeking, she found that openness to trade is a significant variable and can promote FDI for either African or other developing countries.

According to Morisset (2000), some African countries, by improving either their business climate or economic environments, can become competitive and subsequently, the interest center of international investors. Based on a group of twenty-nine countries, for the period 1996 and 1997, her paper put out the importance of local market size on FDI inflow into Africa. Morisset (2000) noticed a positive correlation between FDI flows and GDP (equal to 0.99). African countries are able to attract significant private capital due to their natural resources endowment. Asiedu (2004) also found that natural resources and market size are the main determinants of FDI in Africa. The efficiency of institutions, measured by bureaucratic quality, corruption and rule of law are also emphasized in her study. Nunnenkamp & Spatz (2002), in the same pursuit of understanding the factors of FDI flows, used a pool of twenty-eight developing countries covering the period 1987-2000. As variables that can significantly influence FDI inflows, their model-building comprises GDP per capita, risk factor, human capital, trade restrictions, bureaucracy and the cost factors. Campos & Kinoshita undertook a similar research on a panel of twenty-five transition countries over the period 1980/1998. For these scholars, openness to trade, liberalization of FDI, market size, low costs factor and resource endowments constitute the significant variables of determining of FDI inward.

From the above-mentioned studies, it can be concluded that there is no specific model for the explanation of determination of FDI flows. Due to the various forms of economics theories, academics and policymakers have introduced in the equation of FDI inflows a whole set of institutional and economic factors, variables related to the market under study, and consequently, their conclusions are generally depending on the temporal and geographical samples.

Additionally, regarding the empirical investigations on impact of FDI, the analysis of the link between FDI and economic growth has been the object of many empirical studies. If some scholars have sought to establish the causal relationship between the two concepts, others have only tried to study the impact of FDI on economic growth. The abundant particularity of this literature review on the effects of FDI on growth is however controversial and mixed. Bronszttein, De Gregorio and Lee (1998) were among the first researchers to examine, while referring to the framework of endogenous growth, how FDI can contribute to the technology diffusion and growth. From a panel of sixty-nine developing countries for the period 1970-1989 and by applying seemingly unrelated regression (SUR) methods, they found that the contribution of FDI to economic growth is positive. Nevertheless, to fully benefit from the potentials of advanced technology and management techniques, the labor force of the host country must possess a certain level of education and competence. Without qualified people, it appears difficult for a country to
absorb the full advantages of FDI. In fact, the intensity of the positive relationship between FDI and
growth is largely determined and correlated to the quality of human capital (the degree of qualification
and competency of workers). Moreover, once the human capital of a host country has reached the optimal
threshold, it seems that FDI becomes more productive than domestic investment.
For ensuring the exploitation of FDI spillovers, while Bronszt et al. (1998), in their research, have
emphasized the highly educated workforce of the host country, Balasubramanyam et al. (1996) stressed
the economic conditions and environment of the domestic country. By estimating the growth-FDI link
from a cross-section data for forty-six developing countries over the period 1970-1985 and applying OLS
method, their analysis showed a positive impact of FDI on growth, but uniquely in countries that
adopted an export promoting strategy. Countries with import substitution approach are weakly affected
by FDI. Olofsdotter’s (1998) analysis is similar to the one performed by Bronsztein et al. (1998). Using
standard OLS method on cross-sectional data of fifty developing and developed countries from 1980 to
1990, she established that the economic growth rate is affected by the stock of FDI and host countries with
good level of institutional capability will enjoy strong effects of FDI. In contrast, De Mello (1999) put in
evidence a weak link between FDI and growth. His paper is based on a sample of thirty-two countries,
from which seventeen are non-OECD countries, and the data are time series covering the period 1970-1990.
To study the relationship between FDI and growth, other researchers such as Zhang (2001) or Choe (2003)
have preferred to use the Granger causality methodology. From a dataset of eleven developing countries
localized in East Asia and Latin America and using co-integration model, Zhang (2001) noticed that FDI
contributes to economic growth but these effects are conditional to the domestic countries characteristics
such as macroeconomic stability, degree of infrastructure development and trade liberalization.
According to Choe (2003), who used a panel data for eighty developed and developing countries, the
causality between FDI and economic growth is bidirectional but it appears more clearly that growth
causes FDI than the contrary. Calice (2008), also by applying the causality tests, found that, in the Haitian
case, for the period 1980-2005, FDI does not cause growth and this last, measured by real GDP and its
rate, does not cause FDI in Granger sense. Carkovic and Levine (2002) came with an unlike conclusion
compared to the researchers mentioned earlier. They settled that inward FDI and growth are not robustly
linked. A sample of data from seventy-two countries and the application of OLS and GMM methods
allow them to conduct the research and find this result.

METHODOLOGY
This chapter describes the methodological framework of this academic paper, which reveals the model
specification, the data sources, and the estimation method. Besides the formulation of the hypotheses, the
section related to the model specification addresses the mathematical description of the economic
phenomenon studied through the identification and description of variables and the determination of
functional form of the model.
Model Specification
The previous chapter, devoted to literature review, allowed us to develop an overview of empirical
studies of the determinants of FDI flows, specifically in developing countries and to review empirically
the effects of FDI on growth. In addition to a lack of consensus due to the multiplicity of theoretical
frameworks and various numerous explicative variables to be taken account into the equation models,
the empirical papers have been the object of a set of technical critics.
At first glance, much research seeking to study the relationship FDI-growth was elaborated in a static and
comparative framework. The use of panel and cross-sectional data has been privileged to the individual-
country data. In fact, the characteristics of host countries under-study have been neglected (Ayala, 2004).
In addition, if taken into consideration, the dynamic aspect of the effect of FDI on growth was often
overlooked. This characteristic is necessary because of the presence of spillovers that involve a
relationship between the various determinants of growth. Moreover, causality problems can originate
from the observed link because FDI could be attracted by countries with a high rate of growth.
Another formulated critic is the omission of important variables in the explanation of economic growth.
A few empirical studies have only introduced one or two variables besides FDI in order to estimate the
growth. This procedure is somewhat inconsistent as the omission of variables can lead to misleading estimates. In fact, FDI could be significantly correlated with other variables, which in turn, affect growth. Therefore, it becomes imperative to know in what ways and to what extent, FDI interacts with other variables. Several factors, such as human capital, the formation of domestic capital, technology transfer, may have a positive impact on growth.

Methodological approaches, the ones the most variant and sophisticated than the others, have been applied to overcome these problems. De Mello (1999), for example, has used Granger causality and cointegration tests on a time series and panel data. Carkovic and Levine (2000) have prioritized instrumental variables techniques in order to study the effects of FDI on growth. Finally, other scholars have chosen to specify and estimate a structural model based on the three stage least squares (Alaya, 2004).

**Model-Building**

Given the reciprocal effects between FDI and growth, we specified a simultaneous equations model. In fact, FDI inflows may influence the growth rate, but in return, this last macroeconomic variable may also have an attractive effect on flux. This procedure allows taking in account the interdependence between FDI and growth, and therefore by passing the problems of selection bias and inconsistent estimates. The model is constructed as following:

\[
\begin{align*}
F_{digdp} &= \beta_0 + \beta_1 \cdot gdpcopen + \beta_2 \cdot gdpcacon + \beta_3 \cdot cap + \beta_4 \cdot tel + \beta_5 \cdot open + \beta_6 \cdot infi + \beta_7 \cdot exch + \epsilon_t \\
gdpcopen &= \beta_8 + \beta_9 \cdot fdigdp + \beta_{10} \cdot invgdpc + \beta_{11} \cdot open + \epsilon_t
\end{align*}
\]

where:

- \( F_{digdp} \): Foreign direct investment as a percentage of GDP
- \( gdpcopen \): Growth rate of real gross domestic product (GDP)
- \( gdpcacon \): Real GDP per capita
- \( cap \): Human capital (the average year of secondary schooling)
- \( tel \): Number of telephones lines per 100 people
- \( open \): Openness, which equals to (imports + exports)/GDP
- \( infi \): Inflation rate
- \( exch \): Official exchange rate
- \( invgdpc \): Domestic investment as a percentage of GDP
- \( \epsilon_t \): Error term

**Variables**

Variables in the model specification can be classified in two groups: the endogenous variables, the dependent ones to be estimated and the explicative ones, the independent factors that allow capturing the economical phenomenon and consequently, have an impact on the model.

i. **Endogenous Variables**

The model specified is a simultaneous equation system with two endogenous variables (GDP growth rate and FDI). This is because if FDI (as a percentage of GDP) can affect the rate of growth via *equation ii*, growth rate of real GDP can also in the other sense influence FDI through *equation i*. There is an interdependence between the two concepts and if not taking in account, will lead to biased and inconsistent estimators.

ii. **Exogenous Variables**

   a) **The FDI determinants equation**

There are a number of economic and institutional factors determining FDI flows. Due to time constraint, in the specific Haitian case, it is included in this equation the following variables: real GDP per capita, trade openness, human capital, infrastructure development, rate of inflation and official exchange rate.

**Market size:** According to the market size hypothesis, foreign investors are more attracted to larger markets, as an efficient use of resources will enable their firms to produce tangible products and therefore, the achievement and exploitation of scale and scope economies (Chakrabarti, 2001; Caves, 1971). Defined as the level of development and the wealth of a country, the size of local market is one of the most important and relevant factors to explain flows of FDI. Market attractiveness, in this study, is
represented by real GDP growth (economic growth, as an indicator of the potential development of host market) and real GDP per capita. Moreover, it is expected a positive relationship between market size and FDI ($\beta_1>0$ and $\beta_2>0$).

**Trade openness**: Measured as the ratio of total trade (export plus import) to GDP, openness of the domestic country is one of the traditional determinants of FDI. As the degree of openness can encourage or can constitute a stimulus for the entry of multinational companies, and therefore more inflows of FDI, it is expected that openness (open) has a positive impact on FDI. Previous papers found that openness could promote FDI (Jun and Singh, 1996; Balasubramanayan and Salisu, 1991).

**Human capital**: When making investments in host countries, multinational enterprises will consider and evaluate the quality of labor force as the more educated are workers, the easier and faster can they adopt and adapt to new technology and therefore, more productive. Thereby, a country with a better-educated labor force is more likely to attract more FDI (Lewis, 1999). Measured by the average year of secondary schooling in this research, human capital is expected to be positively associated with FDI as stipulated by other scholars (Root and Ahmed, 1979; Boreinsztein et al., 1998; Assiedu, 2002).

**Infrastructure development**: The term infrastructure is multidimensional and embodies telecommunications systems, ports, roads, railways, electricity, water, sanitation and so on. As well-developed infrastructure allows foreign investors to reduce their operating costs, they will be more interested in countries with good infrastructure. Therefore, infrastructure can be viewed as a stimulus for FDI flows ((Wheeler & Mody, 1992; Morrisset, 2000). In the literature, it is usually used the number of telephone lines per 1000 inhabitants to measure the infrastructure but in this study, it’s proxied by the number of telephone lines per 100 people. A positive relationship between infrastructure and FDI is assumed by empirical studies.

**Inflation rate**: Representing the changes in the general price level, inflation is a proxy of the macroeconomic stability. The higher is its rate, the less conductive is the economic climate for investments, as more time, money and energy are needed by investors to adjust to the rising price level. Markets with a volatile and unpredictable inflation rate will have an unstable environment that will discourage investors and therefore, will not constitute an inciter or incentive for MNE’s FDI activities. By its effects of local currency devaluation, inflation rates diminish the real return on investment. Therefore, it is expected a negative correlation between FDI and inflation as flows of FDI will decrease with high and unpredictable inflation rates (Birhanu, 1998).

**Exchange rate**: It is another variable to capture the macroeconomic instability effect. The theoretical literature is uncertain about the relationship between the exchange rate and FDI. If the exchange rate in the host country is high, this will motivate investors to make more investments in order to make more profits if, of course, the goods and services are sold in the country. Nevertheless, if that production is oriented to others foreign territories through exports, this will have the opposite effect and lead to a harmful situation. Subsequently, it cannot be concluded for the sign for the exchange rate.

**b) The growth equation**

The growth equation is derived from the neoclassical theoretical framework. Although empirically controversial, it is theoretically accepted that FDI can promote growth by bringing external capital, advanced technology, and better management in organizations in the host country. Due to its potential spillovers, FDI should exert an effective positive impact on growth and enhance the economic situation of the domestic country. Therefore, following the modernization hypothesis, it is expected a positive sign of the coefficient of FDI in the growth equation whereas dependency hypothesis would expect the coefficient of FDI to be ambiguous.

It has also been included in the growth equation two other explanatory variables which are domestic investment (as a share of GDP) and trade openness. It’s established that these factors are correlated positively and significantly to economic growth.

**Hypothesis**

The hypotheses of this academic research, presented below, can be grouped in two categories: the main hypothesis focused on the two key concepts under-study (GDP growth rate and FDI), and the specific ones, related to the host country market.
Main hypothesis

H1: There is a positive significant reciprocal relationship between FDI and GDP growth rate. Explicitly, market size (GDP growth) affects significantly and positively FDI (market size drives FDI), and this variable is expected to have positive impact on GDP growth.

Secondary or specific hypotheses

H2: Openness to trade has significant positive effect on FDI.

H3: FDI in Haiti is associated negatively with the inflation rate in this country.

Data Source and Analysis Tool

As the regression analysis is employed as empirical method to achieve the objectives and to test the hypotheses in this academic research, the Econometric Views (E-Views 7) software constitutes our main data analysis tool.

Data, which are secondary ones and annual time series, cover thirty-one years period, dating from 1980 to 2010. They come from either national or multinational institutions and are retrieved from World Bank (World Development Indicator, 2010), International Monetary Fund (IMF), Banque de la République d’Haïti (BRH) and Barro-Lee, which is a panel data set on educational attainment for 146 countries from 1950 to 2010.

Estimation Method

The specified model consists of a simultaneous equation system. In case of this type of system, it is important to calculate the identifiability criterion model, which indicator will allow choosing which estimation method is the most suitable and appropriate.

Let g, the number of endogenous variables,

\[ g' \], the number of endogenous variables of the equation j

k, the number of exogenous variables in the model,

and \[ k' \], the number of exogenous variables in the equation j.

Condition identification is as following:

- If \((g - g') + (k - k') < (g - 1)\), the equation is under-identified and its parameters cannot be estimated.
- If \((g - g') + (k - k') = (g - 1)\), the equation is just identified. The equation can be estimated by indirect least squares (ILS) and two-stage least squares (2SLS).
- If \((g - g') + (k - k') > (g - 1)\), the equation is over-identified and the parameters of the equation can be estimated by two stage least squares (2SLS).

In the case of our model specification, we have: \(g = 2\) (number of equations); \(k = 4\) (number of exogenous variables)

For the FDI determinants equation (1):

\[
\text{fdigdp} = \beta_0 + \beta_1 \text{gdpcopen} + \beta_2 \text{gdpcacon} + \beta_3 \text{cap} + \beta_4 \text{tel} + \beta_5 \text{open} + \beta_6 \text{infi} + \beta_7 \text{exch} + \epsilon_t \quad \text{(equation 1)}
\]

\(g = 2;\ k = 7\) and \(g' = 2;\ k' = 6\) then, \((g - g') + (k - k') = (2 - 2) + (7 - 6) = 0 + 1 = 1\)

and \((g - 1) = (2 - 1) = 1\; \text{if and only if} \; (g - g') + (k - k') = (g - 1)\), the equation is just identified.

For the growth equation (2):

\[
\text{gdpcopen} = c + \beta_1 \text{fdigdp} + \beta_2 \text{invgdpc} + \beta_3 \text{open} + \epsilon_t \quad \text{(equation 2)}
\]

\(g = 2;\ k = 7\) and \(g' = 2;\ k' = 2\) then, \((g - g') + (k - k') = (2 - 2) + (7 - 2) = 0 + 5 = 5\)

and \((g - 1) = (2 - 1) = 1\; \text{if and only if} \; (g - g') + (k - k') > (g - 1)\), the equation is over identified.

Considering the above results (one equation is just identified and the other is over identified), the two stage least squares, to the best of our knowledge, is the most appropriate to be applied for the model estimation under-study.

This regression method, as the indirect least squares (ILS) and the LIML (limited information maximum likelihood) belongs to the group of estimation techniques with limited information. Employed for estimating simultaneous equation system, they focus mainly on one equation at a given time without using any information contained in the detailed specification of the rest of the model. The other group of regression methods, which enables to solve a model system of simultaneous equations, is the estimation techniques with complete information, which encompasses the three stage least squares (3SLS) and the full information maximum likelihood (FIML). These techniques concentrate on the whole system in which all equations of the structural model, fully specified, are estimated simultaneously.
ANALYSES OF RESULTS
This chapter, dedicated to the analysis of the results, is divided in three sections. First, it is proceeded an exploratory data analysis, which allows us to describe the evolution and behavior of the two endogenous variables of interest. The second section is devoted to a set of tests, which aim to ensure the validity of the model. Finally, the estimators of the regressions are analyzed and interpreted while focusing on validating or not the research hypotheses.

Exploratory data Analysis
This section investigates the graphical relationship between the main variables. It is also taken a look at the pair-wise correlation matrix and unit root tests are performed for all the series, so that to avoid fallacious regressions.

Evolution of FDI as a percentage of GDP
Figure 4.1 illustrates the trend of FDI inflows as a percentage of GDP into Haiti from 1980 to 2010. This evolution, which is erratic, can highlight several characteristic periods. It is firstly noted the decrease of FDI flows from 0.84% to 0.19% during 1980-1986. This steady decline is partly due to the climate of political uncertainty that starts to be instituted in the country (uprising of the society against the authoritarian regime of Duvalier) and does not provide trust to the foreign investors. This period is followed by a slight increase in FDI (from 0.36% to 0.81%) for the next 4 years. The period 1991-1994 is marked by a process of accelerated disinvestment and the country has reported the most important outflows of capital. This can be explained by the economic and financial blockade imposed on the country. However, FDI has slightly increased in 1995, one year after the lifting of the embargo. It is only in 1999, with the privatization of some enterprises and the telecommunications sector deregulation that FDI has increased quite relatively. This trend is more or less accentuated during the last five-year term (2005-2010), where FDI has reached the highest proportions, with values of 3.36% and 2.28%, respectively for the years 2006 and 2010.

Graphical comparison of FDI (percentage of GDP) and growth rate of real GDP
Figure 4.2 plots the FDI inflows into Haiti (as a percentage of GDP) and the annual growth rate of real GDP and it allows us to examine graphically the potential association between the endogenous variables under-study. It appears, at first glance, that FDI is less volatile than the growth rate of GDP and the two series are not moving proportionally and/or at the same pace. In fact, it is clearly showed that FDI (percentage GDP) is insignificant and too weak in comparison to GDP growth. In addition, for the all period (1980-2010), FDI and GDP growth display different tendency in periodic fluctuations. Consequently, all the foregoing might suggest that FDI inward is not a catalyzer of economic growth in Haiti, and therefore does not constitute an explanatory factor.
Correlation matrix

Pair-wise correlation matrix Table 4.1 measures the intensity of the relationship between the series. This table reveals that FDI is weakly correlated with all the variables. If this correlation coefficient is negative with GDP per capita (-0.19) and inflation (-0.29), there is a positive association with the other variables: GDP growth rate (0.12), capital (0.35), telephone lines per 100 inhabitants (0.26), openness (0.45) and official exchange rate (0.39). It can also be noticed a positive small correlation between GDP growth rate and openness (0.12), GDP growth rate and domestic investment (0.28).

Table 4.1: Comparative evolution of FDI (percentage of GDP) and growth rate

<table>
<thead>
<tr>
<th></th>
<th>FDIGDP</th>
<th>GDPCOPEN</th>
<th>GDPCACON</th>
<th>CAP</th>
<th>TEL</th>
<th>OPEN</th>
<th>INFI</th>
<th>EXCH</th>
<th>INVGDPC</th>
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<td>1</td>
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<tr>
<td>GDPCOPEN</td>
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<td>1</td>
<td></td>
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<tr>
<td>GDPCACON</td>
<td>-0.19</td>
<td>-0.03</td>
<td>1</td>
<td></td>
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<td></td>
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<tr>
<td>CAP</td>
<td>0.35</td>
<td>0.11</td>
<td>-0.93</td>
<td>1</td>
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<tr>
<td>TEL</td>
<td>0.26</td>
<td>0.19</td>
<td>-0.72</td>
<td>0.77</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPEN</td>
<td>0.45</td>
<td>0.12</td>
<td>-0.76</td>
<td>0.92</td>
<td>0.72</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>INFI</td>
<td>-0.29</td>
<td>-0.21</td>
<td>-0.43</td>
<td>0.18</td>
<td>0.27</td>
<td>-0.02</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EXCH</td>
<td>0.39</td>
<td>0.07</td>
<td>-0.83</td>
<td>0.94</td>
<td>0.84</td>
<td>0.94</td>
<td>0.18</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>INVGDPC</td>
<td>0.39</td>
<td>0.28</td>
<td>-0.71</td>
<td>0.89</td>
<td>0.79</td>
<td>0.96</td>
<td>-0.05</td>
<td>0.91</td>
<td>1</td>
</tr>
</tbody>
</table>

Unit roots test

When models are regressed with non-stationary data, it is likely to lead to spurious results. Thereby, in order to avoid this problem, it is firstly examined the stationarity of the time-series variables. It exists numerous methods of stationarity detection such as Said and Dickey (1984), Phillips (1987), Phillips (1987), Phillips and Peron (1988), Kwiatkowski, Phillips, Schmidt and Shin (1992). For this paper, it is applied the Augmented Dickey Fuller (ADF) test to detect the presence of unit root in the series. The ADF test results show that the variables FDI (fdigdp), GDP growth rate (gdpcopen), GDP per capita (gdpcacon), capital (cap), and telephone lines per 100 inhabitants (tel) are stationary in level while the series openness (open), inflation (infi), official exchange rate (exch) and domestic investment (invgdpc) become stationary after taking their first differences. Therefore, as all variables are not integrated of the same order, they cannot theoretically co-integrated in the Granger sense.
Table 4.2: Unit root test results

<table>
<thead>
<tr>
<th>Variable</th>
<th>Level/difference</th>
<th>With trend and intercept</th>
<th>With intercept</th>
<th>None</th>
<th>Conclusion</th>
</tr>
</thead>
<tbody>
<tr>
<td>fdgdp</td>
<td>Level</td>
<td>-3.32</td>
<td>-2.96</td>
<td>-2.11</td>
<td>I (0)</td>
</tr>
<tr>
<td>gdpcopen</td>
<td>Level</td>
<td>-5.16</td>
<td>-5.19</td>
<td>-5.32</td>
<td>I (0)</td>
</tr>
<tr>
<td>gdpacon</td>
<td>Level</td>
<td>-1.65</td>
<td>-1.91</td>
<td>-3.2</td>
<td>I (0)</td>
</tr>
<tr>
<td>cap</td>
<td>Level</td>
<td>-2.47</td>
<td>-1.2</td>
<td>-6.14</td>
<td>I (0)</td>
</tr>
<tr>
<td>tel</td>
<td>Level</td>
<td>-4.01</td>
<td>-</td>
<td>-</td>
<td>I (0)</td>
</tr>
<tr>
<td>open</td>
<td>Level</td>
<td>-1.2</td>
<td>-1.29</td>
<td>3.09</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First difference</td>
<td>-4.08</td>
<td>-3.55</td>
<td>-2.83</td>
<td>I(1)</td>
</tr>
<tr>
<td>infl</td>
<td>Level</td>
<td>-2.5</td>
<td>-2.52</td>
<td>-1.64</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First difference</td>
<td>-6.11</td>
<td>-6.19</td>
<td>-6.3</td>
<td>I(1)</td>
</tr>
<tr>
<td>exh</td>
<td>Level</td>
<td>-2.1</td>
<td>0.05</td>
<td>1.67</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First difference</td>
<td>-4.66</td>
<td>-0.66</td>
<td>0.97</td>
<td>I(1)</td>
</tr>
<tr>
<td>invgdp</td>
<td>Level</td>
<td>-2.07</td>
<td>-0.66</td>
<td>0.97</td>
<td></td>
</tr>
<tr>
<td></td>
<td>First difference</td>
<td>-5.38</td>
<td>-5.45</td>
<td>-5.27</td>
<td>I(1)</td>
</tr>
</tbody>
</table>

**Statistical tests**

The estimation of an econometric model requires methodological precautions to ensure the validity of results. Attempting to respect criterions validity and robustness for the model which has been regressed by the 2SLS (Table 4.4; SEM1), below are performed three statistical tests.

**Stability test**

With equations regressed by the 2SLS methodology, Chow test is generally used to test the hypothesis of structural stability of a model over the analyzed period. The year of 1991, which coincides with the beginning of the economic blockage in the country, has been retained as breakpoint and it is supposed from this date, changes can happen on the coefficients of the regressions.

Table 4.3: Chow Test results

<table>
<thead>
<tr>
<th></th>
<th>FDI equation</th>
<th>GDP equation</th>
</tr>
</thead>
<tbody>
<tr>
<td>F-statistic</td>
<td>0.3189</td>
<td>0.5005</td>
</tr>
<tr>
<td>Prob.</td>
<td>0.9455</td>
<td>0.7356</td>
</tr>
</tbody>
</table>

For both of the equations, probability is more than 5%, consequently the model, composed of the simultaneous FDI and GDP functions, is stable for the period 1980-2010 and estimators do not change significantly and structurally.

**Autocorrelation test**

Durbin Watson (DW) statistics are computed to investigate the autocorrelation between the series of observations. If DW value borders on 2, there is no autocorrelation, but the closer this indicator is to 0, the more positive will be autocorrelation. DW values are 1.89 and 2.16 respectively for the equations of FDI and GDP, which are substantially close to 2. Therefore, there is no evidence of serial correlation in the data.

**Tests of significance**

The analysis of the significance of the model is performed in two steps: on one hand, it is analyzed the overall quality of the model and on the other hand, it is tested the individual quality of every estimator. Because of the introduction of instrumental variables in the regression of equations by the 2SLS method, interpreting R2 is not the same as usual, for example as in the ordinary least squares (OLS). The analysis of F-stat is more adequate and a Prob (F-Statistic) inferior to 5% implies a significance of the model at this level. Subsequently, whereas the model of FDI is only globally significant at 10% (p-value =0.0539), the growth equation is significant at 5% (p-value = 0.00021).

Regarding the coefficients of the exogenous variables included in the simultaneous equations model (Table 4.4), all of them have the expected sign, except the inflation rate for equation i1 and openness for...
equation ii1. Moreover, student’s t-tests reveal that GDP per capita (gdpcacon), human capital (cap), exchange rate (exch) and domestic investment (invgdp) are significant at 5% as the t-stat associated of these variables are greater than the critical value read (1.96). In conclusion, the three econometric tests, conducted previously, show that our model is well specified, there is no autocorrelation and that the model is structurally stable.

**Estimation, interpretation and discussion of the results**

One of the difficulties and flexibilities within the instrumental variables (IV) estimating procedure is and remains the identification of instruments to be introduced in the estimations. Finding good instruments (which are predictors of the variable of interest and uncorrelated with the disturbance) is problematic. Facing also this problem, all the exogenous variables included in our simultaneous equation system have been used for estimating the coefficients of the model by 2SLS regressions (Table 4.4; SEM1). Furthermore, OLS has also been run for the model and the results (SEM2) have been compared with the estimators computed with the 2SLS (SEM1). It seems that the two methods (OLS and 2SLS) do not largely differ and are approximately identical (Table 4.4, SEM1, SEM2), which result has been confirmed by the Hausman Test (Appendix E). In fact, this test is employed to investigate the endogeneity of a variable by comparing the instrumental variable (IV) estimation and two-stage least squares (2SLS) to ordinary least squares (OLS) estimation. Moreover, in the presence of endogeneity, OLS and 2SLS will produce different estimators and OLS regressors are not consistent. In our case, W and V are found not significant (after the sequence of regressions in Eviews, view Appendix E), therefore it’s concluded that there’s no presence of endogeneity and the estimates of OLS and 2 SLS prove to be approximately the same.

A third model (Table 4.4; SEM3) has been estimated, where the logarithm of GDP per capita (lgdpcacon) and the exchange rate (lexch) have been taken. Whereas the first variable (lgdpcacon) is stationary in level, the second (lexch) is integrated of order 1. Compared to the first model (SEM1), regressions results have been slightly improved, but it is found that growth rate of GDP (gdpccopen), in addition to be insignificant, has a negative sign. This result is someway absurd (Ayala, 2000) and totally in contradiction with the theoretical literature. Ayala (2000) has led to the same finding in a study where he tries to explain the effects of FDI on economic growth in Tunisia through a simultaneous equations model.

Due to the problem of multicollinearity observed between the exogenous variables (table 4.1), it is estimated a fourth model (Appendix F) where variables highly correlated between themselves (exch, open, tel) have been withdrawn from the equation of determinants of FDI. The result is quite satisfying. In fact, the model is globally significant at 10% level and among the four (4) explicatives variables, half of them, market size and human capital (gdpcacon and cap), are found to be significant respectively at 5% and at 1%. Moreover, both exert a positive influence on FDI inflows.

Below, it is analyzed and interpreted the estimators of the 2SLS technique (Table 4.4; SEM1).

**Table 4.4: Regression Results (1980-2010)**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Determinants of FDI (fdigdp)</th>
<th>Determinants of growth (gdpcopen)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2SLS OLS 2SLS OLS 2SLS OLS 2SLS</td>
<td>SEM1 SEM2 SEM3 SEM1 SEM2 SEM3</td>
</tr>
<tr>
<td>Constant</td>
<td>-0.0818** (0.0328) -0.0798** (0.0324) -0.3553* (0.1917) -0.007 (0.0072) -0.0057 (0.0062) -0.0093 (0.0073)</td>
<td></td>
</tr>
<tr>
<td>fdigdp</td>
<td>1.0436 (1.0179) 0.7605 (0.6537) 1.5267 (1.0072)</td>
<td></td>
</tr>
<tr>
<td>gdpcopen</td>
<td>0.0042 (0.061) 0.0241 (0.042) -0.0058 (0.0594)</td>
<td></td>
</tr>
<tr>
<td>gdpcacon</td>
<td>3.3E-05** (1.36E-05) 3.25E-05** (1.35E-05)</td>
<td></td>
</tr>
<tr>
<td>lgdpcacon</td>
<td>0.0452* (0.0245)</td>
<td></td>
</tr>
<tr>
<td>cap</td>
<td>0.0208** 0.0207** 0.0194**</td>
<td></td>
</tr>
</tbody>
</table>


The FDI determinants equation

In view of results (Table 4.4, SEM1), it can be noticed that foreign direct investment (FDI) is correlated positively with the rate of growth (correct expected sign), but this variable does not influence significantly FDI. Therefore, the growth rate proves to be not a statistically significant factor in the explanation/determination of FDI inward in Haiti. A possible explanation is that international firms, which make investments in the local country, are not primarily looking for market shares in the host country, but are trying to minimize their costs of production factors. GDP per capita, which is a proxy of market, is found positively related to foreign direct investment (FDI) and is significant at 5% level. Precisely, one unit of change in the GDP per capita will bring 0.0000333 unit changes in the total FDI inflows in Haiti. Many scholars such as Asiedu (2002), Chakrabarti (2001), have highlighted this positive significant correlation between FDI and market size. 

As for human capital, it influences positively and significantly foreign direct investment (FDI), which result is in conformity with the finding of Boreinsztein et al (1998). In fact, an augmentation of 1 point in the average year of secondary schooling will increase by 0.0208 point the net FDI inflows. FDI can lead to an accumulation of human capital through the transfer of technology and know-how. Openness is found no significant in the FDI equation but it has the expected positive sign. This result may reflect that there still exist some barriers to trade in Haiti and/or blockade such as quotas, abusive tariffs customs and police harassment despite the numerous efforts of economic liberalization initiated by the Haitian government. Therefore, this stipulates that the country needs to open more to the external world and undertake more economic reforms to improve their attractiveness towards foreign investors.

The infrastructure indicator (tel) has a positive impact on FDI but it is statistically insignificant. This indicates that telecommunications in Haiti, more specifically the fixed telephone service infrastructure, is not enough developed to attract FDI inflows. Asiedu (2002), in her attempt to look for the determinants of FDI in Africa, has also found that infrastructure is not significant. Macroeconomic instability has been represented by the inflation rate and the official exchange rate. If the first is found to be positive and not significant, which result is not in conformity with the economical literature; the latter exogenous variable is negative and significant. The exchange rate is of great importance for foreign investors because it characterizes the stability of the national currency in comparison to the international market.

The GDP growth equation

Domestic investment (invgdpc) proves to be a determining factor in explaining economic growth in Haiti and it presents a high significance. The coefficient associated to domestic investment is 1.075; meaning
that if it increases by 10%, the growth rate will rise by 10.75%. As for FDI, it has the appropriate sign but it is not significant. The weakness of FDI flows in Haiti can partly explain this insignificance. In addition to this fact, another aspect to be underlined is the issue of the quality of foreign investment. According to many scholars [Kokko (1994), Moran (1998), Harrison (1996), Görg and Hijzen (2004)], the impact of FDI is highly dependent on the mode of establishment (Greenfield or acquisition), the industry, the competition between MNCs and local firms, and the degree of development of the host country. Therefore, the nature of FDI is primordial. In Haiti, investments are more or less oriented in primary or tertiary sectors and so, less carrier of technological externalities. In short, in addition to be weak, FDI inflow is generally used in areas where contribution of new technologies is less important (textile, agriculture ...). Table 4.4 indicates that openness is negatively associated to growth rate of real GDP and it is not statistically significant for economic growth. Trade openness may have a negative impact on the economic development. A very fast opening may have destructive effects on the local economy (Winter et al., 2002).

CONCLUSION
Research Summary
This academic paper has been conducted in a twofold purpose: on one hand, to investigate the key determining factors of FDI flows in Haiti and in the other hand, to assess the effect of FDI on the Haitian Economy. The regressions results reveal that FDI flows in Haiti are principally determined by market size (GDP per capita), level of human capital, and exchange rate. These variables exert a significant positive influence on net FDI inflows. Regarding to trade openness and infrastructure, they have been found insignificant but with the expected sign. Subsequently, it can be thought that it exists certain barriers, which still hamper the economic opening of Haiti. Moreover, the infrastructure related to fixed telephony service is not well developed enough. Finally, the estimations show that inflation rate is positive and insignificant.

As a stable source of investment capital, FDI, can be a major player in the economic growth and development and may be of great help for developing countries, confronted with the problem of financing their economic activity with insufficient domestic resources. Nonetheless, in the specific Haitian case, if the results show that FDI and economic growth interact positively, it appears that this interaction is weak. Moreover, economic growth has no significant impact on FDI and this latter does not exert influence on economic growth.

Policy Recommendations
Given the results, it is formulated the following policy propositions in sight of an improvement of the macroeconomic framework of the country, so that it can increase the FDI inflows and take, to some extent, advantage of its effects and positive externalities:

• A strengthening of the education system to reflect sectors which can motivate and mobilize FDI. In a context of competition with other Caribbean countries, education shall be directed in highly qualified and technical area while meeting the standard and international requirements.

• A better development of physical infrastructure as they can reduce the operating costs of investors. For example, if electricity is provided continuously, regularly and without interruption, multinational enterprises will not need to procure power-generating sets. Moreover, they will avoid the costs related to fuel and maintenance. Furthermore, the government should keep on investing heavily in basic infrastructure (roads, telecommunications, airports, ports, hospitals, etc.). Regions relatively less equipped in infrastructure must be prioritized. Such strategy and choice would reduce the regional disparities, lead to a certain decentralization of the country and establish new potential areas of development, capable to attract and drain FDI flows.

• A revision of tariff and non-tariff measures to reduce transaction costs and create an environment conducive to trade.

REFERENCES


Carbaugh, R. J. (2004). International economics : South-Westen Thomson, Ohio, USA.


